

REMARKS

Claims 2-6, 9, 11-14 and 18-20 remain pending in the present application. Claims 1, 7, 8, 10 and 15-17 have been cancelled. Claims 2-6, 9 and 11-14 have been amended. Claims 18-20 are new. Basis for the amendments and new claims can be found throughout the specification, claims and drawings originally filed.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-4 and 6-8 are rejected under 35 U.S.C. § 102(b) as being anticipated by Stolberg (EP 0889244 A2). Applicants respectfully traverse this rejection. Claims 1, 7 and 8 have been cancelled. Claims 2-4 and 6 have been amended to depend from Claim 9 as discussed below. Reconsideration of the rejection is respectfully requested.

Claims 1-2, 4, 6-8 and 11-17 are rejected under 35 U.S.C. § 102(e) as being anticipated by Sugawara, et al. (US 2002/0106547 A1). Applicants respectfully traverse this rejection. Claims 1, 7, 8 and 15-17 have been cancelled. Claims 2, 4, 6, 8 and 11-14 have been amended to depend from Claim 9 as discussed below. Reconsideration of the rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 5, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Stolberg in view of Takechi, et al. (U.S. Pat. No. 6,550,265). Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara, et al., in view of Stolberg (EP 0889244). Claims 5, 9 and 10 are rejected under 35 U.S.C. § 103(a) as

being unpatentable over Sugawara, et al., in view of Takechi, et al. (U.S. Pat. No. 6,550,265). Applicants respectfully traverse this rejection.

Claim 9 is now directed to the vapor compression type refrigerant cycle that has an ejector in which a high-pressure refrigerant is jetted and boiled so that a speed of the jet flow reaches up to the supersonic speed at a radial outside position of a needle extended from an outlet port of a nozzle. In addition, a housing is disposed around the nozzle to define a flow passage for a low-pressure refrigerant that is drawn by the jet flow from the outlet port. As a result, an outer envelope of the jet flow is adapted in accordance with a flow amount of the high-pressure refrigerant and the low-pressure refrigerant. In conclusion, Claim 9 recites a two-phase ejector for a refrigerant cycle that uses a liquid-phase flow medium for the primary medium supplied to the nozzle and a gaseous-phase flow medium for the secondary medium drawn by the jet flow of the primary medium.

The ejector provides inventive jet flow on a downstream side of the outlet port in which the high-pressure refrigerant is expanded and boiled to increase speed of the jet flow up to the supersonic speed and the outer boundary of the jet flow is adjacent to the low-pressure refrigerant so that an outer shape (balanced shape) of the jet flow is adaptive in response to a flow amount of the high-pressure refrigerant and the low-pressure refrigerant.

Stolberg (EP 0889244) does not teach or show such a two-phase ejector. Sugawara (US 2002/0106547) also discloses an ejector for gaseous medium only. Although, Takeuchi (U.S. Pat. No. 6,550,265) discloses a refrigerant cycle using an ejector handling two-phase flow, Takeuchi merely discloses a simple silhouette of the

ejector and is silent about the advantageous effect of the outwardly extended needle for the jet flow of the high-pressure refrigerant that is in liquid-phase. In this technical field, such as the flow dynamics or an industrial refrigeration, flow condition, i.e., mono-phase or two-phase, is important when designing the apparatus. Therefore, even if the ejectors in Stolberg and Sugawara are known, it is not obvious and thus still inventive to combine them with the refrigerant cycle of Takeuchi since the flows handled in those ejectors are different from each other.

Thus, Applicants believe Claim 9, as amended, patentably distinguishes over the art of record. Likewise, Claims 2-6 and 11-14, which ultimately depend from Claim 9, are also believed to patentably distinguish over the art of record. Claim 10 has been cancelled. Reconsideration of the rejection is respectfully requested.

NEW CLAIMS

New Claim 18 is a dependent claim which depends from Claim 9 to add the limitation of a gas-liquid separator to Claim 9.

New Claim 19 is a dependent claim which defines the mixing section as being a generally cylindrical portion of the housing as illustrated in Figure 2.

New Claim 20 is a dependent claim which defines the length of the mixing section as being greater than the length of the tapered portion of the needle as illustrated in Figure 2.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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